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EXAMINER

ZERVIGON, R

ART UNIT

PAPER NUMBER

1763

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Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.
08/905,971

Applicant(s)
Kazayuki et al

Examiner
Rudy Zervigon

Group Art Unit
1763



☒ Responsive to communication(s) filed on Jan 3, 2000

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 35 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claim

☒ Claim(s) 1-26 is/are pending in the application

Of the above, claim(s) _____ is/are withdrawn from consideration

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 1-26 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☒ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been
☒ received.

☐ received in Application No. (Series Code/Serial Number) _____

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☐ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s) _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

— SEE OFFICE ACTION ON THE FOLLOWING PAGES —

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DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 1-4, 7-16, 20-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tateishi et al (U.S. Pat. 4,405,435) in view of Mikio Takagi (Pub. No. 2-152251). Tateishi et al describe *a substrate processing apparatus (Figure 4)* where component chambers are each *hermetically* configured (column 1, lines 35-45) and exhibit the following attributes:
 - i. *a substrate transfer section* embodied by Tateishi et al here as item 52/53, Figure 4 (column 5, lines 40-55)
 - ii. *a plurality of modules* embodied here by Tateishi et al as *processing chambers for processing substrates* (items 54, Figure 4; column 5, lines 40-55) and *a plurality of modules* embodied by Tateishi et al as *first and second intermediate processing* or *treatment chambers* (items 52-55 Figure 4; column 5, lines 40-55) *for processing substrates*.
 - iii. *first substrate transfer means* embodied by Tateishi et al as item 62 of Figure 2 (column 5, lines 55-68) provided in
 - iv. *a substrate transfer section* (items 52/53, Figure 2) *capable of transferring a substrate to the plurality of modules*

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- v. *a first valve (items 64, figure 2; 71, figure 6) capable of establishing hermetic (column 2, lines 43-63) isolation between the processing chambers for processing substrates (items 3, all Figures; column 1, lines 45-50) and a plurality of modules embodied by Tateishi et al as first and second intermediate processing or treatment chambers (items 52-55 Figure 4; column 5, lines 40-55) when the first valve is closed and allowing a substrate to pass through when opened*
- vi. *a second valve (item 71, figure 4) capable of establishing hermetic (column 2, lines 43-63) isolation between the first and second intermediate processing or treatment chambers (items 52-55 Figure 4; column 5, lines 40-55) and a substrate transfer section embodied by Tateishi et al here as item 52, Figure 2 (column 5, line 53) when the second valve is closed and allowing a substrate to pass through when opened*
- vii. *a third valve (item 77, figure 2) capable of establishing hermetic (column 2, lines 43-63) isolation between the first and second intermediate processing or treatment chambers (items 52-55 Figure 4; column 5, lines 40-55) and a substrate transfer section embodied by Tateishi et al here as item 52, Figure 2 (column 5, line 53) when the third valve is closed and allowing a substrate to pass through when opened*
- viii. *first and second intermediate processing or treatment chambers additionally are provided with second substrate transfer means (item 67, Figure 4; column 6, lines 16-30) capable of transferring a substrate to a processing or treatment chamber.*

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- ix. all component chambers are each *hermetically* configured (column 2, lines 43-63) *and can be independently reduced in pressure (items 69, 76, 112, 8, Figure 6, column 6, line 33 - 45).* Motivation for such design is additionally provided (column 6, line 33 - 45).
- x. *an intermediate chamber (item 52/53, Figure 2) supporting substrate holding means (items 65/72, Figure 4) positioned closer to the substrate transfer section (items 52, Figure 4) than the second substrate transfer means (item 78, Figure 4)*
- xi. Tateishi et al describe *cassette holding means accommodating a plurality of substrates (Items 63,68,75; column 5, lines 55-65) where the first substrate transfer means is capable of transferring a substrate between the cassette and plurality of modules.*
- xii. Tateishi et al describe a *first substrate transfer means structure capable of transferring a wafer cassette (item 67, Figure 4; column 6, lines 16-30).*
- xiii. Tateishi et al specifically describe a *cassette introduction section whose height is different from the height of the cassette holding means (all Figures).* Tateishi et al describe *processing a plurality of substrates simultaneously.*

Tateishi et al do not expressly describe *modules piled up separately in a substantially vertical direction.*

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Mikio Takagi describes a manufacturing system of vertical-type semiconductor (title, JPO abstract). Specifically, Mikio Takagi describes "...a process chamber installed in each stage position of a space positioned in an up-and-down direction..." in order to "...reduce a floor area and to easily install more systems...". Thus the Mikio Takagi reference supports *a substrate processing apparatus hermetically configured exhibiting modules piled up separately in a substantially vertical direction*. Mikio Takagi additionally describes all component chambers each *hermetically configured and can be independently reduced in pressure (abstract, "Individual process chambers are evacuated in advance to a prescribed pressure by using individual pumps 3")*. Mikio Takagi additionally provides for *an elevator capable of vertically moving a first substrate transfer means (items 11, 14; constitution)*. Mikio Takagi additionally provides for *an elevator capable of vertically moving a first substrate transfer means (items 11, 14; constitution)*. Component chambers are each *hermetically configured* (certified STIC translation, page 5, second paragraph) and exhibit the following attributes:

- xiv. *a substrate transfer section* embodied by Mikio Takagi here as item 14, Figure 1, (certified STIC translation, page 12, 3rd paragraph)
- xv. *a plurality of detachably* (first paragraph, page 11) *attached modules* (items 14/2/3, Figure 1; certified STIC translation, pages 10-12) and *a plurality of modules* embodied by Mikio Takagi as *processing or treatment chambers* (items 2, Figure 1; certified STIC translation, pages 10-12) *for processing substrates*.
- xvi. *first substrate transfer means* embodied by Mikio Takagi as item 14 of Figure 1 (certified STIC translation, pages 10-12) provided in

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- xvii. a *substrate transfer section* (item 14, Figure 1) *capable of transferring a substrate to the plurality of modules*
- xviii. a *first valve (items 12, figure 1) capable of establishing hermetic* (certified STIC translation, page 5, second paragraph) *isolation between the processing chambers for processing substrates and a plurality of modules where the first valve is closed and allowing a substrate to pass through when opened* (certified STIC translation, page 12, last paragraph)

It is the examiner's position that a person of ordinary skill in the art, at the time the invention was made, would have found it obvious to modify the Tateishi et al *substrate processing apparatus* by implementing the Mikio Takagi *substrate processing apparatus hermetically* configured exhibiting *modules piled up separately in a substantially vertical direction*. Motivation for such design alteration of the Tateishi et al *substrate processing apparatus* is provided by Mikio Takagi. Specifically, "To reduce a floor area and to easily install more systems (...*modules being detachable attached...*)" which is centered on reducing the clean room foot print in order to reduce operating costs (. Hence, impetus is economical.

3. Claims 5,6,17,18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tateishi et al (U.S. Pat. 5,186,718) as applied to claims 1-4, 7-16, 20-25 above, and further in view of Hideki Lee (U.S. Pat. 5,616,208). Tateishi et al do not describe processing *substrates under atmospheric pressure* through a *substrate transfer section*. Hideki Lee describes a vacuum processing apparatus including a plurality of vacuum processing chambers (column 9, lines 19-34). Specifically, Hideki Lee

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describes processing *substrates* serially and *under atmospheric pressure* (column 10, lines 32-42) through a *substrate transfer section* (items 20, 21, Figure 8). Additionally, Hideki Lee (column 5, lines 1-14), describes processing substrates in a *substrate processing chamber* (items 1, 2, and 3, Figure 8) *under reduced pressure* (column 9, line 24).

It is the examiner's position that a person of ordinary skill in the art at the time the invention was made would have found it obvious to modify the Tateishi et al multichamber processing apparatus whereby substrates are transferred through a *substrate transfer section* (items 20, 21, Figure 8) while sustaining atmospheric pressure as is taught by Hideki Lee. Motivation for processing substrates that are transferred through a *substrate transfer section* (items 20, 21, Figure 8) while sustaining atmospheric pressure during the transfer is centered on selecting where, in the processing of the substrate, the reactant gas will be introduced. Such selection is within the independent pressure control as exhibited by the references and encompassed within the level of ordinary skill in view of the cited references.

4. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tateishi et al (U.S. Pat. 5,186,718) as applied to claims 1-4, 7-16, 22 above, and further in view of Shunpei Yamazaki (U.S. Pat. 4,582,720). Tateishi et al describe an *intermediate chamber* (item 24, Figure 1) supporting *substrate holding means* (item 40, Figure 1) *positioned closer to the substrate transfer section* (items 21, Figure 1) *than the second substrate transfer means* (item 42, Figure 1, 2, 3a, 3b, 4a, 4b). However, Tateishi et al does not specifically describe an *intermediate chamber* supporting heat-resistant *substrate holding means positioned closer to the substrate transfer section than the second substrate*

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transfer means. Because the Tateishi et al apparatus plasma processes the substrate in later chambers (items 34, Figure 1), this may imply that there is no heat resistance imparted to the *intermediate chamber substrate holding means*. The structural characteristics of Shunpei Yamazaki's plasma assisted chemical vapor deposition apparatus (column 2, lines 13-21) is in many respects identical to the presently claimed apparatus. The primary difference between the presently claimed invention at that of Shunpei Yamazaki's plasma assisted chemical vapor deposition apparatus is the orientation of the device itself. The presently claimed invention has its long axis (processing direction vector) parallel to the gravity vector while the long axis (processing direction vector) of the Shunpei Yamazaki apparatus is perpendicular to the gravity vector. Specifically, Shunpei Yamazaki describes *a substrate transfer section (item A, Figure 1), an intermediate chamber (item B, Figure 1), and a final processing chamber (item C, Figure 1). An intermediate chamber (item B, Figure 1), supports heat-resistant substrate holding means (item 70, Figure 1) used in the intermediate processing chamber under a heated plasma process (column 5, lines 17-25; lines 55-59).*

It is the examiner's position that a person of ordinary skill in the art at the time the invention was made would have found it obvious to enhance the Tateishi et al *intermediate chamber (item 24, Figure 1) supporting substrate holding means (item 40, Figure 1) positioned closer to the substrate transfer section (items 21, Figure 1) than the second substrate transfer means (item 42, Figure 1, 2, 3a, 3b, 4a, 4b)* by employing heat-resistance as taught by Shunpei Yamazaki's plasma assisted chemical vapor deposition apparatus. Motivation for employing heat resistance to the

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Figure 1, 2, 3a, 3b, 4a, 4b) by employing heat-resistance as taught by Shunpei Yamazaki's plasma assisted chemical vapor deposition apparatus. Motivation for employing heat resistance to the *substrate holding means (item 40, Figure 1)* is drawn from the fact that plasma generating apparatus commonly operate at elevated temperatures.

Response to Arguments

5. Applicant's arguments with respect to claims 1-26 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (703) 305-1351. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official AF fax phone number for the 1763 art unit is (703) 305-3599. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (703) 308-0661. If the examiner can not be reached and specific inquiry on the merits of the cases's prosecution is desired then contact the examiner's supervisor Marian Knode at (703) 308-4311.


THI DANG
PRIMARY EXAMINER
GROUP 1700

Serial Number: 08/905,971

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Rudy Zervigon - RZ

March 20, 2000